supernumerary cavities, as well as the passages or canals which extend into the labyrinth.

The only practical deduction from the preceding views, regards the assistance which may possibly be derived from attention to them, in our diagnosis of deafness, when we wish to discover whether it is owing to a palsied state of the auditory nerves themselves, or merely to some defect or injury of the adjunct members of the auditory apparatus. The every day occurrence of a person squeezing his head with both hands to deaden any very loud noise, may very probably effect the desired purpose, as well by interrupting the cranial vibrations, as by the direct obstruction of the auditory passages.—*Journ. Hebdom. No.* 16, 1834.

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8. *On the Question of Venous Absorption.* By Dr. Luchtmans.—Mention is made by Hippocrates[*] and Galen[†] of absorption and inhalation, which they believed were effected in the human body through the agency of the arteries and veins. But when Harvey, in the seventeenth century, had fully illustrated the circulation of the blood, from which it was plain that the blood was conveyed by the arteries from the centre to the periphery of the body, the power of the arterial absorption was deservedly rejected.[‡] Not long after the discovery of the circulation of the blood, Casparus Asellius, (anno 1622,) found vessels filled with a whitish fluid in the mesentery of a dog, and on the surface of the intestines, which he named lacteals and lacteal veins. Already some idea of these had occurred in Herophilus and Erasistratus, (three hundred years before the birth of Christ;) and even in the year 1556, Bartholomæus Eustachius saw the thoracic duct in a horse, but mistook it for a vein, and called it the white thoracic vein, therefore, many physiologists have assigned the function of absorption to these vessels, discovered by Asellius in the first instance; after that Olaus Rudbeck, (anno 1650,) more fully demonstrated the thoracic duct, both its origin and continuation from the lacteal veins.

When diligent investigation taught that the lacteal vessels, in appearance at least, differed somewhat from the lymphatics, but that this kind of vessels was commonly dispersed throughout the body, physiologists began to doubt the seat of absorption and its apparatus, moreover, to divide into opposite opinions. For some regarded venous absorption to be proved by the testimony of the ancients; others thought that this action was to be attributed only to the lymphatic vessels.

Glisson, Bilsius, and Swammerdam[§] are among those who supported venous absorption, who, having tied the mesenteric veins in a live animal, and after some time having opened them, saw the blood contained in them mixed with white striæ, and imagined that this matter was absorbed from the intestines by the veins. But some explain these striæ to consist of coagulable lymph; others of chyle not well mixed with the blood, and more or less dispersed through the whole body; while Hewson and Rudolph determine that the chyle was received from the arteries.

It was the opinion of Haller that veins, with the power of absorption, arose with small open mouths from the cavities of the body, and the cellular tissue, &c. as appears from various passages in his Elements of Physiology.[‖] He also derives jaundice from the bile absorbed through the sanguiferous veins.[¶] Others, as Rosen, Waller, Meckel, Lobstein, and Sir Astley Cooper, have observed, that mercury injected into the lymphatic vessels, passed into the branches of the vena portæ. Tiedemann and Fohmann have found this anastomosis to exist in the glands.

K. Boerhaave (anno 1730) injected water into the stomach and intestines of a dead dog, and after continual pressure for several hours, writes that it entered the mesenteric and gastric veins, and propelled the blood.[*] But many persons, and among others Dr. Van de Sande,[†] contend, in order to render this argument unavailing, that the water penetrated through the organic pores, or through a rupture. J. F. Meckel filled the vesiculæ seminales with waxy matter, having tied the excretory ducts, and observed this matter penetrate the minute branches of the hypogastric vein. So, also, water injected into the bladder of a male subject passed into the same vein.[‡] Neither Cruikshank nor Dr. Oudeman succeeded in this experiment, wherefore they suppose the injected matter passed into the veins through ruptured vessels.[§]

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[*] Epidem. L. vi.

[†] Comment. in Hippocr. Epidem. L. vi.

[‡] P. J. Van Maanen, *Diss. de Absorpt. solidorum, p.* 15.

[§] Vid. Oudeman, Diss. de venarum imprimis meseraicarum fabrica et actione. Gronin. 1792, p. 90.

[‖] Tom. i. p. 151; *tom. vii. p.* 47; ubi dicit; "Facilis etiam et patula via ab iisdem (meseraicis) venis est in intestinum," et Tom. vii. p. 89.

[¶] Sommering, de morbis vasorum absorbentium, p. 122.

Moreover, others have alleged the deficiency of lymphatics in some parts, as in the placenta, which, however, appears doubtful; and that blood effused into the cells of the corpora cavernosa penis is taken up by veins.[‖] They also adduce the capacity of the venous system, which far exceeds the arterial, and the small dimensions of the thoracic duct, as if it were not sufficient to receive and propel all the moisture which is contained in the lacteal and lymphatic vessels.[¶] But even the slower motion of the venous blood corresponds with the greater capacity of the veins.

Here may be mentioned the arguments derived from tying or wounding the thoracic duct, such as Haller[**] and Flandrin[††] bring forward, the lesion of which animals have survived a long time, seeming to prove that other channels exist besides the thoracic duct, by which chyle passes into the blood. Nevertheless, it is evident that these arguments are equally incapable of proving venous absorption, since a double thoracic duct has often been discovered.

Hence it appears that the arguments produced by many of the ancients to demonstrate venous absorption, have not placed this subject beyond all doubt; neither do the arguments taken from the incubation of eggs prove more—in which veins are present before arteries and lymphatic vessels: for a conclusion on so imperfect a state is scarcely tenable with respect to the human body.

Flandrin was the first who at length studied to recal the learning of the ancients on venous absorption; being urged by the observation, that the blood of the mesenteric veins in a horse had a peculiar aromatic odour, and analogous in taste to urine, which the blood in the remaining veins in the body did not possess. He injected into another horse half a pound of assafœtida, dissolved in honey, and smelt it in the venous blood, but not in the chyliferous vessels.[‡‡] Magendie having succeeded him, instituted the following experiments. He separated in such a manner a part of the small intestine of a dog, which had been previously well fed, that it adhered to the body only by one artery and vein: one extremity of this portion being carefully tied, he injected the poison upas, and prevented its effusion by a ligature. Death followed as soon as if the poison had been introduced into the sound part of the intestine; appearing to him a proof that this poison was absorbed by the small branches of the remaining vein. Since, however, the slender twigs of nerves probably penetrate the coats of the artery, and follow their course, doubts can be started whether these poisonous effects cannot be explained by an affection of the nerves themselves.

He separated the thigh of a dog from the rest of the body, previously stupefied by opium, so that only the crural artery and vein remained, having removed the cellular coat of these vessels, lest lymphatic vessels might accidentally pass through this. He then injected two grains of the same poison into the foot of this side; the symptoms appeared as soon, and as powerfully, as when the poison is applied to a sound foot.[§§]

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[*] De Perspir. dicta Hippocr. Leidæ, 1738.
[†] Diss. de Venis lacteis, illarumque agendi modo. Gronin. 1784, p. 66.
[‡] Experimenta et observ. de finibus vasorum, Berot. 1772, p. 49.
[§] Oudeman, i. c. p. 28.
[‖] Schreger, Fragm. Anat. et Physiol.; fasciculus I. Leipzig, 1793.
[¶] Oudeman, i. c. p. 115.
[**] El. Physiol. tom. vii. p. 68.
[††] L'Esprit des Journ. Oct. 1791, p. 375, seq.
[‡‡] Magendie, Physiol. tom. ii. p. 263.
[§§] Ibid. tom. i. p. 25, seq.

The experiments were repeated with the same result by Lawrence and Coates. It is, indeed, supposed that the poison was placed in contact with the blood itself, and passed into the circulation by a way made in this direction; but Emmert, in experiments performed upon frogs, introduced the poison between the skin and muscles, and the same result ensued. It would, however, be difficult to show clearly that the application was made without injury to the smaller vessels.

Fodera filled a portion of the small intestine of a live animal with a solution of prussiate of potass: having tied the intestine on both sides, he saw, after he had placed the intestine in a solution of sulphate of iron, the lymphatic vessels and mesenteric veins tinged with a bluish colour.[*] My most esteemed instructor performed this experiment, after the interval of a year, and could only detect absorption of the prussiate of potass in the lymphatic vessels, but not in the veins. The prussiate of potass contained in the portion of the intestine was not changed in colour after half an hour, so that the sulphate of iron had not penetrated the walls of the intestine.[†]

According to Tiedemann and Gmelin, colouring, odoriferous, metallic, and saline matters, are, in the first place, absorbed by the mesenteric veins; the chyle especially, by the lacteal vessels. White striæ were also observed in the blood of the vena porta by these celebrated men, which they explain from the anastomosis of the lacteal vessels with the sanguiferous veins. Lawrence and Coates detected a solution of prussiate of potass both in the chyle and in the blood, although more abundantly in the blood;[‡] the contrary was observed by the Society of Philadelphia.[§]

At length, Mayer injected a solution of prussiate of potass into the trachea of a rabbit; he found this sooner in the blood than in the chyle; and in the left ventricle of the heart before the right: the same thing occurred, although the thoracic duct had been tied; which, indeed, seems to prove that this solution was absorbed by veins from the bronchial extremities, but not by lymphatic vessels. The same person observed in a man who died from pulmonary affection, the veins of the small intestines, at least the minuter branches running on the surface of the small intestine, filled with a gray matter, similar to chyle, which were visible to the naked eye even at the margin of the valves of Kerkring. The greater trunks contained blood: the lymphatic vessels were empty, which difference he attributed to the venous system living longer than the lymphatic, or from the right side of the heart dying later than the left.

There is certainly a great difference between the manner in which functions are performed, during health, in the living body, and that in which they are exercised, and after vivisections have been instituted, by which, in addition to the other injuries, the nervous system, at least in many, is violently disturbed. Besides, the substances introduced or applied, in order to illustrate this or that physiological question, in the greatest degree differ from the nourishing matter naturally swallowed. Although, therefore, it would be very hazardous to apply rashly to the human body all opinions which depend upon experiments, nevertheless, we think it can be deduced from the experiments by Mayer and Tiedemann, that their opinion is not devoid of all appearance of truth—that the power of absorption exists both in the lymphatic vessels, the mesenteric and pulmonary veins.

Another question is added, which has lately been agitated by physiologists—whether another passage of the lymphatic vessels into the veins exists, besides the thoracic duct alone; either the insertion of several into the left subclavian vein, or occasionally into the right; whether, therefore, the power of absorption is peculiar to veins—whether they convey what the lymphatic vessels pour into the veins by anastomosis.

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[*] Magendie, Jour. de Phys. tom. iii. p. 80.

[†] J. Koker, Diss. de subtiliori membranarum serosarum fabrica, p. 61.

[‡] Lund. l. c. p. 65.

[§] Ibid. p. 64.

Already anatomists have observed, while injecting the lymphatic glands, the veins sometimes filled with quicksilver.[*] It happened to J. F. Meckel, who saw mercury had penetrated the vena cava, after he had injected a lumbar gland,[†] which Hewson, Cruikshank, Mascagni, &c. attributed to ruptured vessels. Falconer[‡] and J. F. Meckel, jun.,[§] have observed the same thing. G. Vrolsk relates that he perceived such a communication in the phoca vitulina. Beclard affirms he often saw the passage of mercury both in the lymphatic vessels and the veins of glands, which, however, he did not attribute to the rupture of vessels.[‖] V. Fohmann, who scientifically investigated this branch of minute anatomy, found the same in man; moreover, in horses, cows, cats, &c. From many of the glands in dogs the mercury passed only into veins. The lymphatic vessels of the small intestine in the phoca marina, appear to terminate only in the mesenteric veins; the same obtained in the bronchial gland.

He also observed in fish, as in the *torpedo marmorata*, and the *esox lucius*, an abundant anastomosis between the lymphatic vessels and veins in the neighbourhood of the heart, and on the surface of the organs subservient to digestion.

Many observations worthy to be read, on this subject, which have produced a similar result, may be found in Lauth.[¶] Even the greater trunks of the lymphatic vessels, according to Lippi, are inserted in man into the renal vein, cava, and vena portæ. Outside the glands he has even represented, in plates, a horse and goose, having this complicated anastomosis; but Fohmann has proved this author to have mistaken sanguiferous vessels proceeding from glands, for lymphatic.

Hence, indeed, it seems to be proved that a communication exists between the lymphatic vessels and veins. Granting this to be true, many arguments alleged in favour of venous absorption would be invalidated; for then, to adduce an example, the chyle, already in the lymphatic glands, might be mixed with the blood in greater or less quantity, by the assistance of the veins.

It remains for us to notice, that even in our time physiologists might be cited, who strenuously deny both absorption of veins, and their anastomosis with lymphatic vessels, among whom Th. Soemmering and Rudolphi are particularly to be mentioned; for their injections do not show any passage of mercury from lymphatics into veins, neither in the dog, dolphin, birds, amphibious animals, nor even in fish; but if mercury should have passed into the veins, they suppose it attributable to ruptured vessels. The lymphatics of the small intestine in the phoca marina extend to a congeries of glands, which is commonly called pancreas Asellii, the lymphatic vessels proceeding from which converge into a duct of marked diameter, to be inserted into the thoracic duct itself;—an observation opposed to Fohmann. Rudolphi especially made the following objections to venous absorption:—1. The difference of structure between the lymphatics and veins. 2. Fluids injected into the cavities of dead animals are taken up by the lymphatics, but not by veins;—which argument does not affect the experiments instituted in living animals by Tiedemann and Mayer. 3. All odoriferous matters penetrate organs, but are not found in lymphatic vessels, because their nature is changed in the glands. Tiedemann found not only odoriferous, but also colouring matters, in the blood of the portal veins. 4. He deduces that some substances are found in the blood, but not in the chyle, both from peculiar causes moderating the absorption of these within the vessels, and from the chemical analysis of an organic substance not as yet sufficiently perfect.[**] But if chemical analysis could detect these substances in the blood, I do not see why they could not be discovered in chyle, which is as yet imperfect blood, and more simple. 5. According to his opinion, matter analogous to chyle existing in the blood, was not absorbed at first by the mesenteric veins, but was changed into genuine blood during sanguification.*

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[*] Haller, o. l, tom. l, p. 177.

[†] Nov. Exper. et Observ. p. 7.

[‡] Experimental Inquiries: London, 1777; p. 46, *nota*.

[§] Lindner, Spec. Med. de Lymphaticorum Systemate, p. 78.

[‖] Anatomie Generale, 476.

[¶] Rudolphi, i. c. page 256.

[**] Ibid.

My valued instructor performed the following experiment before many pupils, in order to establish whether the passage of quicksilver from the lymphatic vessels and glands into the veins, was to be ascribed to ruptured vessels:—He carefully sought for the lymphatic vessels of the left fore-paw in a well-fed dog, which had been quickly killed by prussic acid, and injected with mercury a little vessel near the carpus; and pursuing the course of the lymphatic vessels to the axilla, there we saw a network of lymphatic vessels, conspicuous on account of the complicated anastomosis, with distinctly turgid valves, filled with mercury. All these lymphatic vessels entered the axillary glands. One larger gland, situated near the insertion of the cephalic vein into the axillary vein, was entirely filled with the quicksilver, without any rupture of the vessels or effusion of quicksilver, which could not be so easily detected in the other glands or lymphatic vessels. We were unable to discover, by the most accurate examination, any other lymphatic vessels going out from the other side of the glands; but a vein filled with mercury went out, terminating in the subcutaneous vein of the neck, which, like the jugular vein, contained mercury. A lymphatic vessel going out from another smaller gland, partially filled with mercury, appeared to extend to a greater gland. He injected a little mercury into a lymphatic vessel of the other foot, and separated it from the body, with the gland and veins which proceeded from the other side of the gland, and terminated in greater veins. We could not detect any lymphatic vessel going out. The parts being arranged on a table, he introduced a tube into a lymphatic vessel, towards the gland, when, after moderate pressure, we saw by the aid of the column of mercury, all the lymphatic vessels of the gland in nodules—not only filled, but the mercury soon began to flow from the veins. Upon increasing the pressure, this vein was turgid with mercury, when a ligature was passed round it. We could not detect in this experiment any rupture of vessels, after the most accurate examination. At length, having opened the thoracic cavity, we saw the thoracic duct turgid with transparent chyle, without a globule of mercury; which proves that mercury, in the former experiment, did not pass from the thoracic duct into the veins.

Should any one wish to establish that the mercury passed from the lymphatic vessels of the gland by ruptured vessels, after such slight pressure, it would be necessary, after the increased pressure, that the mercury should be effused from this rupture not only into the vein, but also into the cellular tissue surrounding the gland, so as to be extravasated; which was by no means the case.

Afterwards, an opportunity offering itself through the kindness of the veterinary professor, Numan, my instructor endeavoured to repeat these experiments in a colt. He filled with mercury the lymphatic vessels in the groin, at the os humeri, and in the mesentery; but after the mercury had entered the glands, an effusion of mercury always occurred from ruptured vessels. After employing less pressure, the glands, indeed, were filled with mercury; but the mercury neither passed from sound, nor from injured and ruptured glands, into other vessels, so that neither the lymphatic vessel going out, nor the adjacent vein, was filled. Perhaps the parts were more or less putrefying, from the increased temperature of the atmosphere, although no putrid odour was evident in the body. If the passage of the mercury from the glands into the veins was the result of rupture of the vessels, I do not see why we no where observed mercury passing from these glands into veins, but into the cellular tissue between the lymphatic vessels of the gland, which was expanded into large vesicles.—*Med. Gaz. June*, 1834.

9. *Structure and Functions of the Skin.*—The *Gazette Médicale de Paris*, for the 8th of February last, contains an analysis of a highly interesting memoir

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* Rudolphi, i. c. page 245.